32 AIR FLOW METER
33 CRANK ANGLE SENSOR
34 CAM SENSOR
42 ACCELERATOR PEDAL DEPERESSION SENSOR
43 CATALYST TEMPERATURE SENSOR
44 INTAKE AIR TEMPERATURE SENSOR
45 WATER TEMPERATURE SENSOR
46 PRESSURE SENSOR
47 AIR/FUEL RATIO SENSOR
48 EXHAUST GAS TEMPERATURE SENSOR

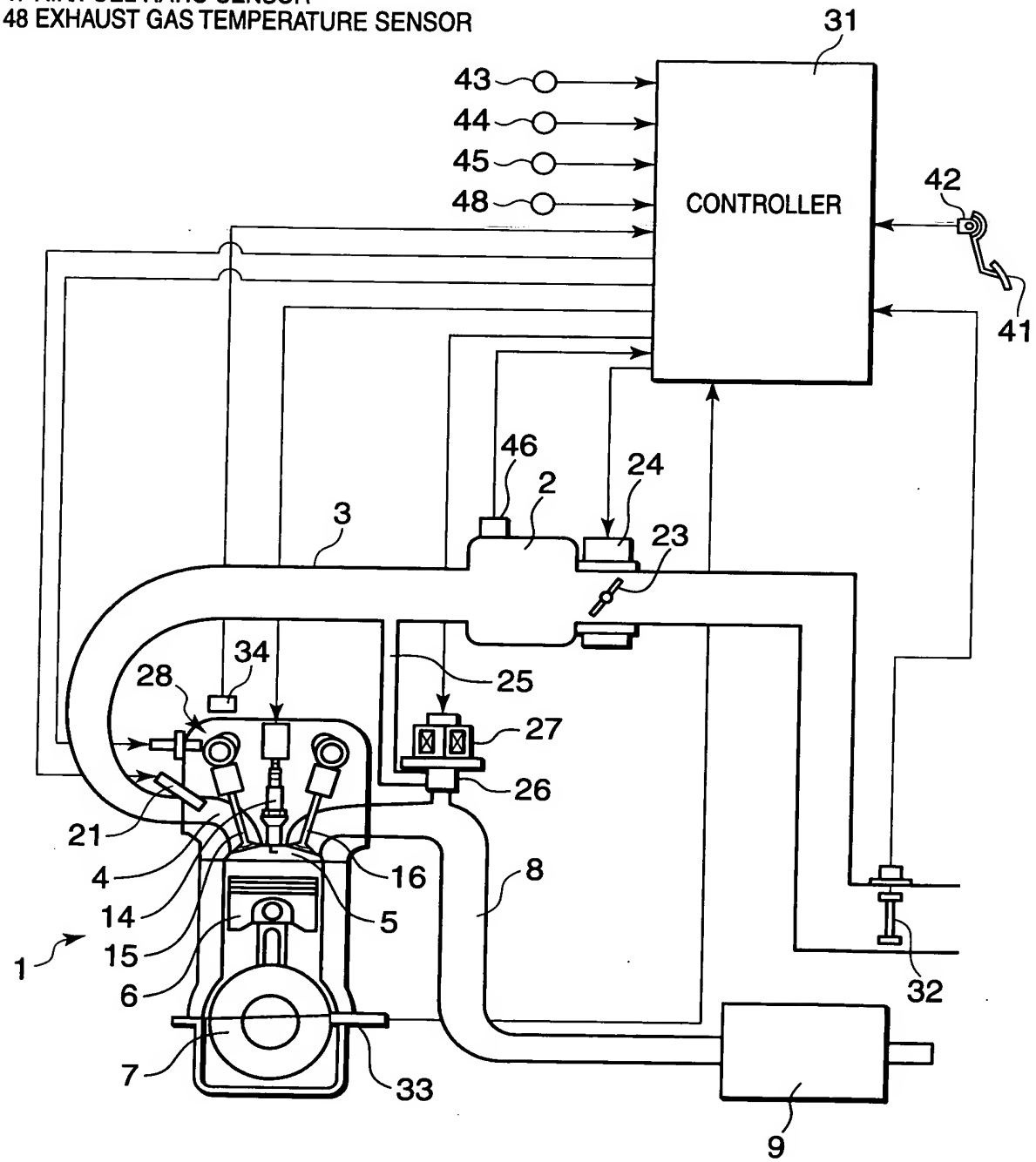

FIG. 1

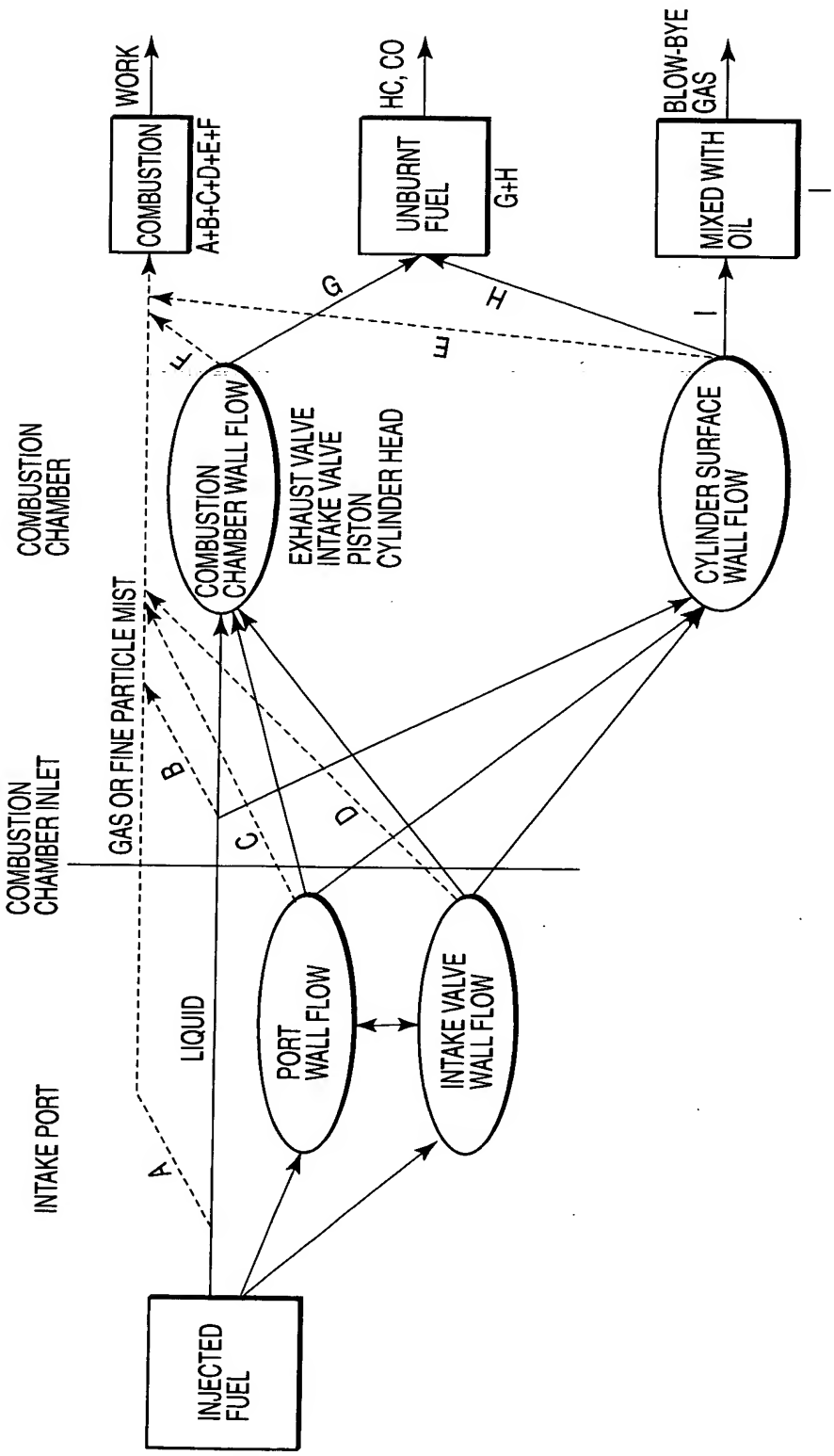
WORK
COMBUSTION
A+B+C+D+E+F
HC, CO
UNBURNT FUEL
G+H
BLOW-BYE GAS
MIXED WITH OIL
I
G
H
F
E
COMBUSTION CHAMBER
COMBUSTION CHAMBER WALL FLOW
EXHAUST VALVE
INTAKE VALVE
PISTON
CYLINDER HEAD
CYLINDER SURFACE WALL FLOW
COMBUSTION CHAMBER INLET
GAS OR FINE PARTICLE MIST
B
C
D
INTAKE PORT
LIQUID
PORT WALL FLOW
INTAKE VALVE WALL FLOW
A
INJECTED FUEL

FIG. 2

Title: ENGINE FUEL INJECTION CONTROL
Inventor(s): Hatsuo NAGAISHI et al.
DOCKET NO.: 040356-0503

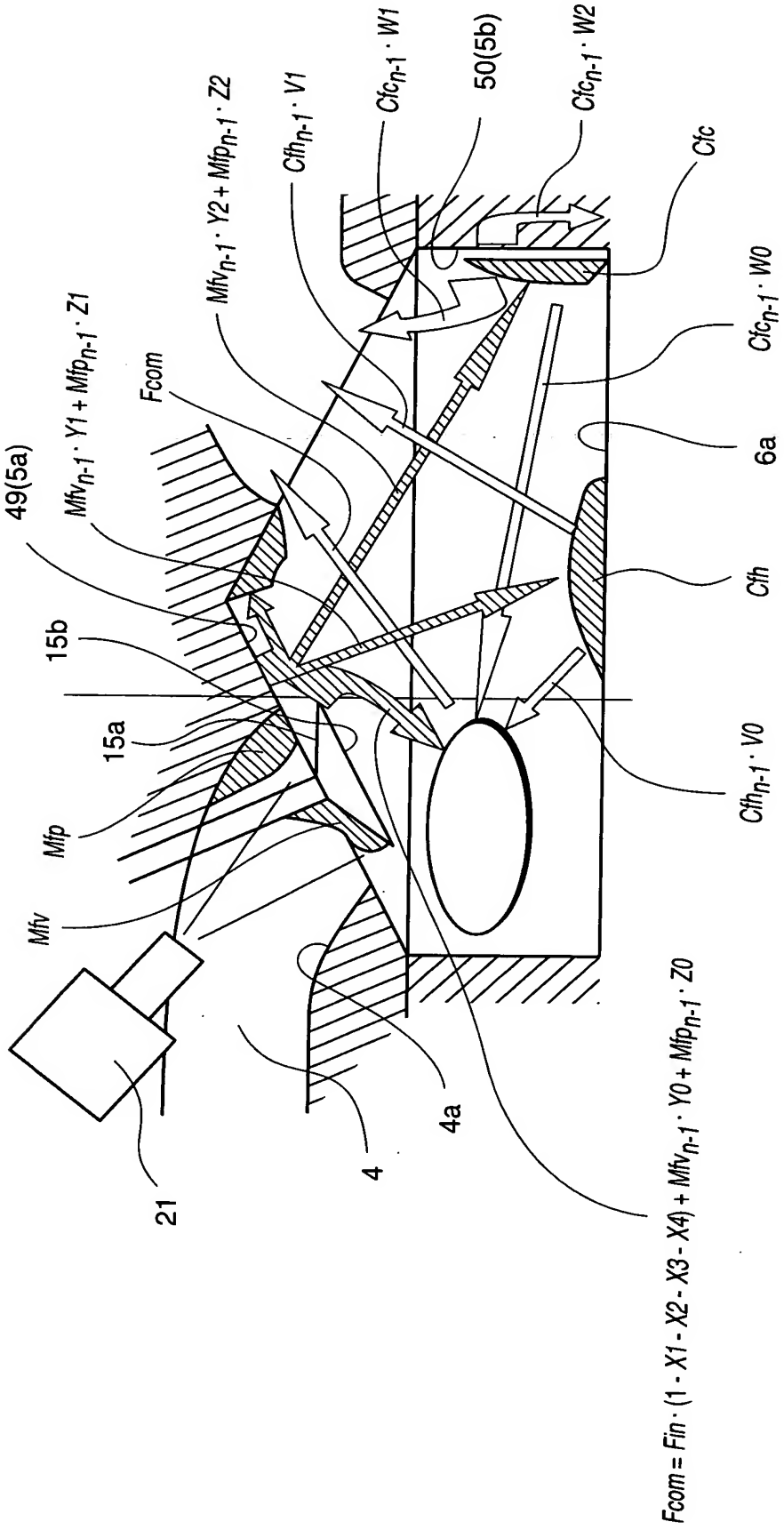

FIG. 3

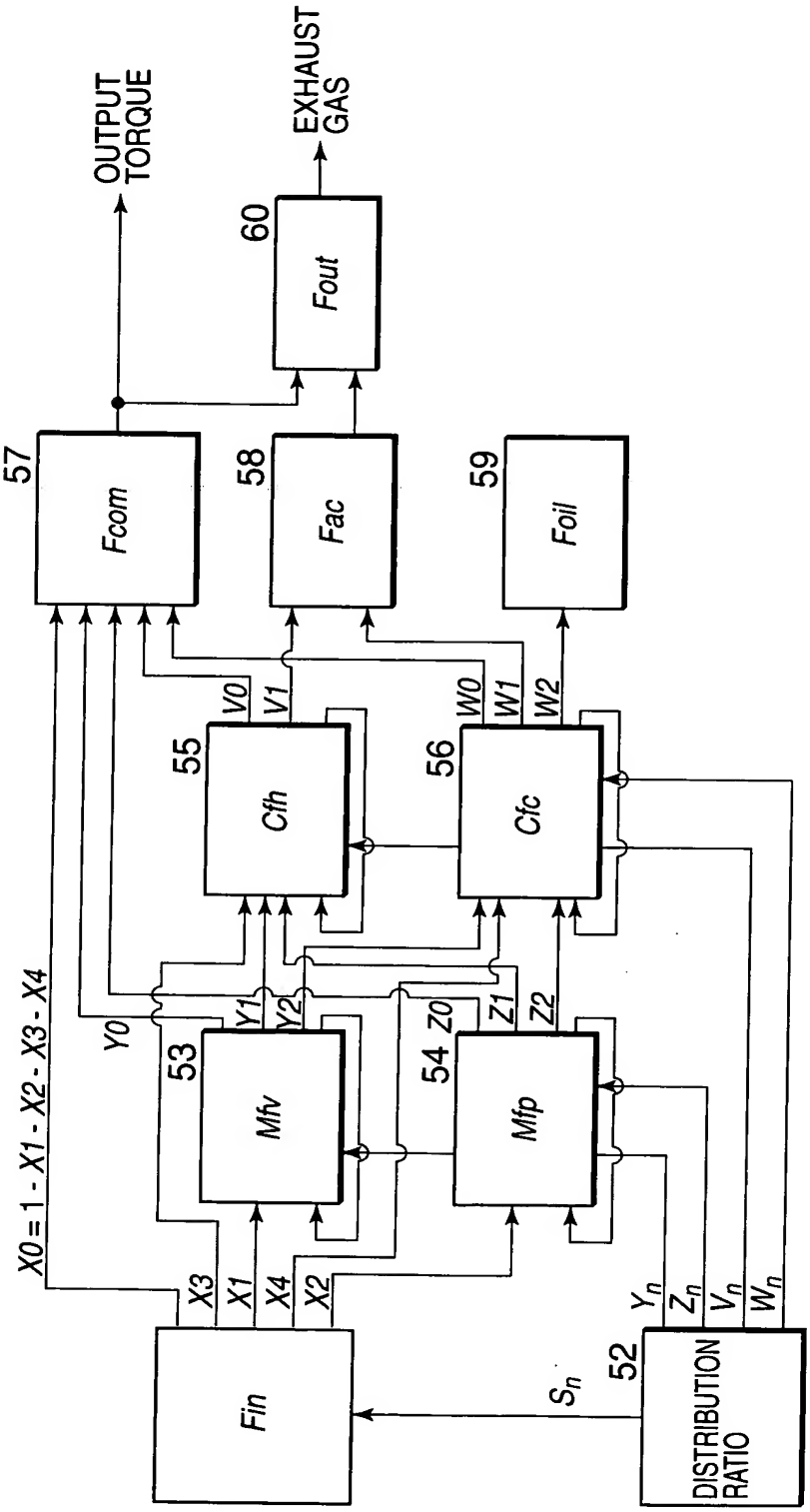
OUTPUT TORQUE
EXHAUST GAS
60
Fout
57
Fcom
58
Fac
59
Foil
V0
V1
W0
W1
W2
55
Cth
56
Cfc
Y0
Y1
Y2
Z0
Z1
Z2
53
Mfv
54
Mfp
X0 = 1 - X1 - X2 - X3 - X4
X3
X1
X4
X2
Yn
Zn
Vn
Wn
Fin
Sn
52
DISTRIBUTION RATIO

FIG. 4

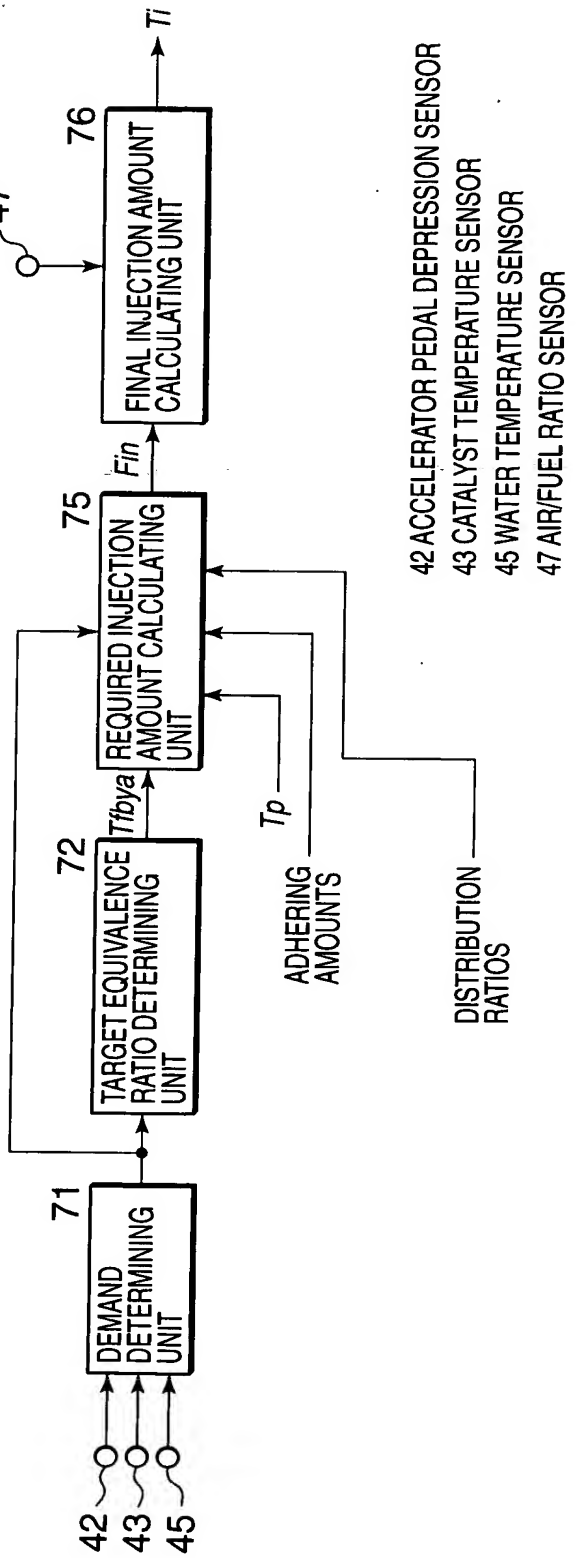
42
43
45
71
DEMAND DETERMINING UNIT
72
TARGET EQUIVALENCE RATIO DETERMINING UNIT
Tfbya
75
REQUIRED INJECTION AMOUNT CALCULATING UNIT
Fin
76
FINAL INJECTION AMOUNT CALCULATING UNIT
Ti
47
Tp
ADHERING AMOUNTS
DISTRIBUTION RATIOS
42 ACCELERATOR PEDAL DEPRESSION SENSOR
43 CATALYST TEMPERATURE SENSOR
45 WATER TEMPERATURE SENSOR
47 AIR/FUEL RATIO SENSOR

FIG. 5

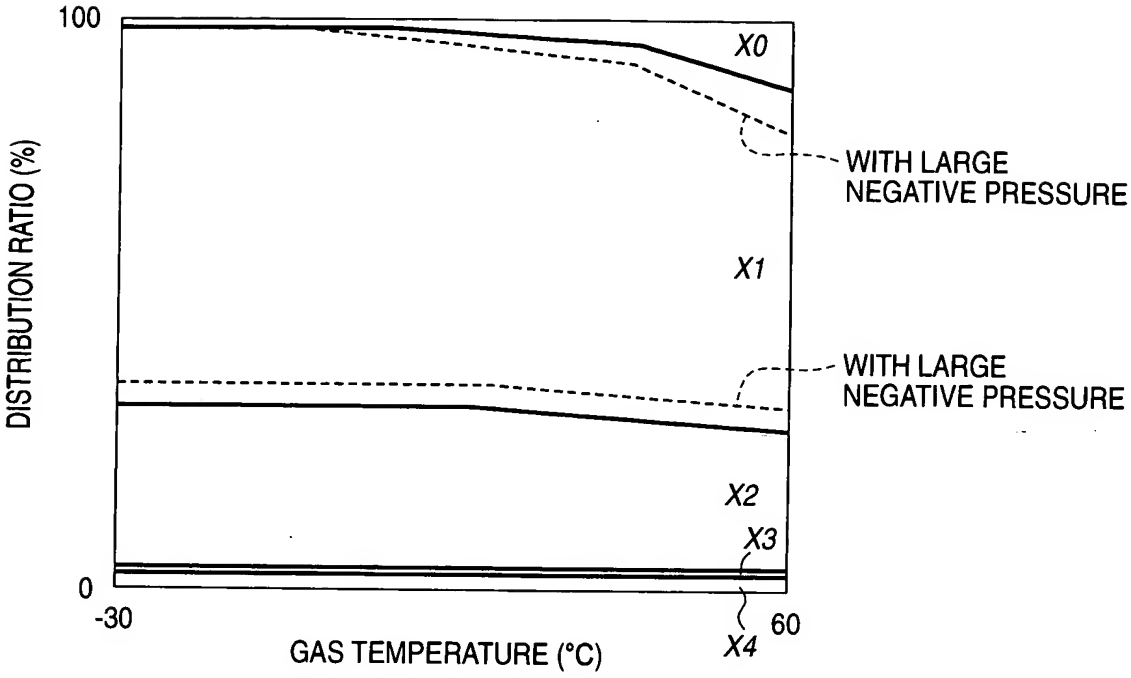
100
0
DISTRIBUTION RATIO (%)
X0
WITH LARGE NEGATIVE PRESSURE
X1
WITH LARGE NEGATIVE PRESSURE
X2
X3
X4
-30
60
GAS TEMPERATURE (°C)

FIG. 6

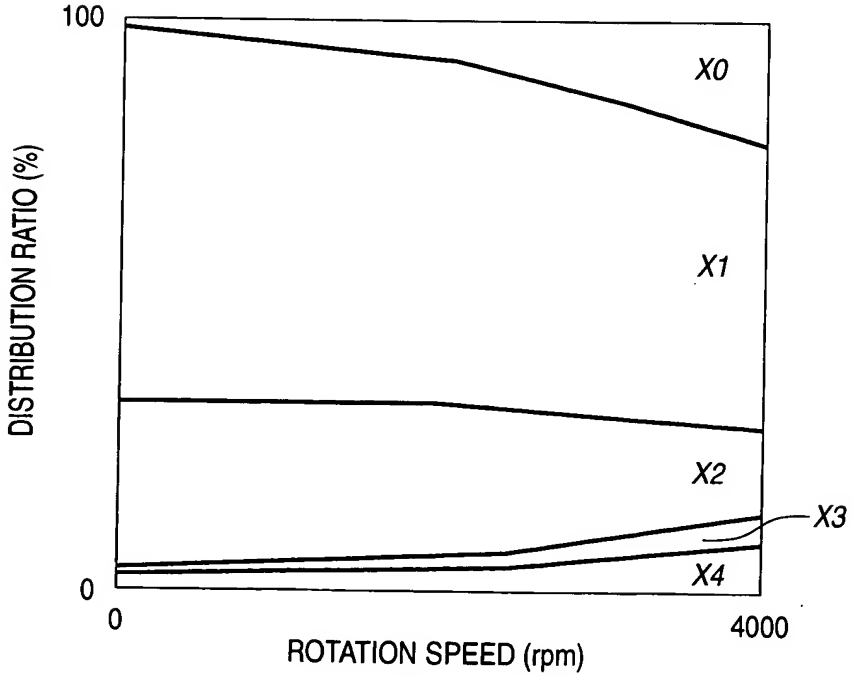
100
0
DISTRIBUTION RATIO (%)
X0
X1
X2
X3
X4
0
4000
ROTATION SPEED (rpm)

FIG. 7

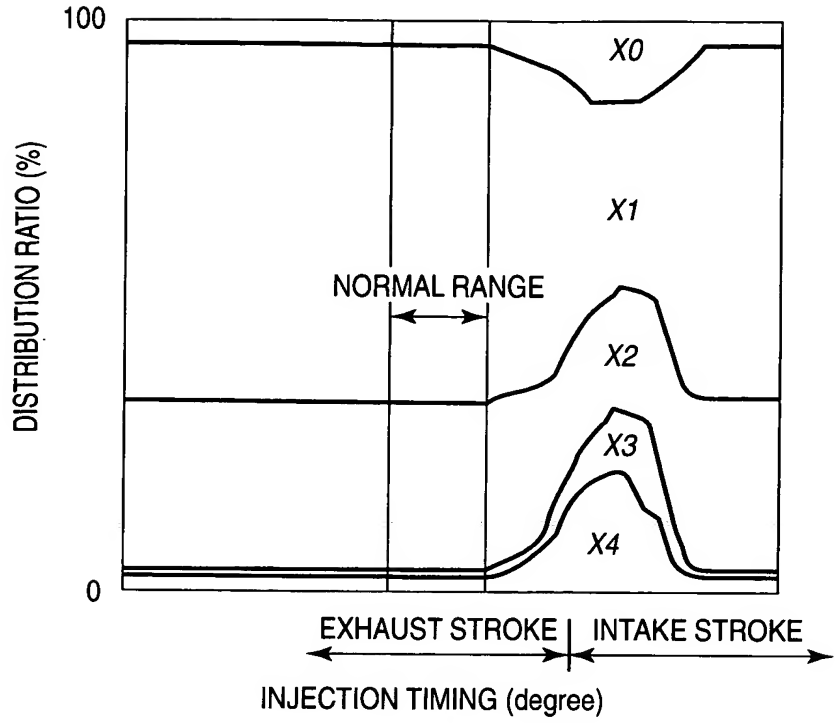
100
0
DISTRIBUTION RATIO (%)
X0
X1
NORMAL RANGE
X2
X3
X4
EXHAUST STROKE
INTAKE STROKE
INJECTION TIMING (degree)

FIG. 8

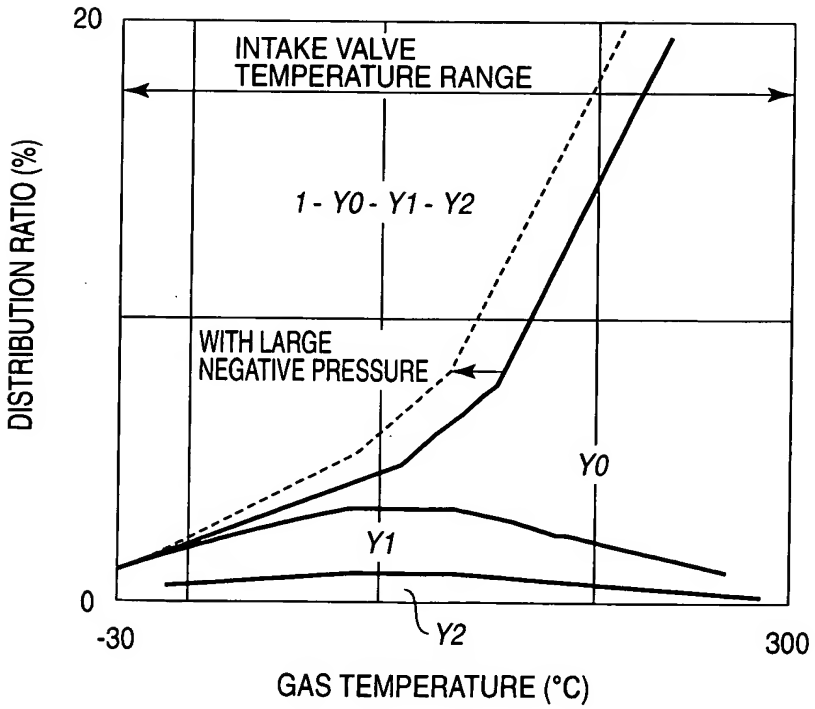
20
0
DISTRIBUTION RATIO (%)
INTAKE VALVE TEMPERATURE RANGE
1 - Y0 - Y1 - Y2
WITH LARGE NEGATIVE PRESSURE
Y0
Y1
Y2
-30
300
GAS TEMPERATURE (°C)

FIG. 9

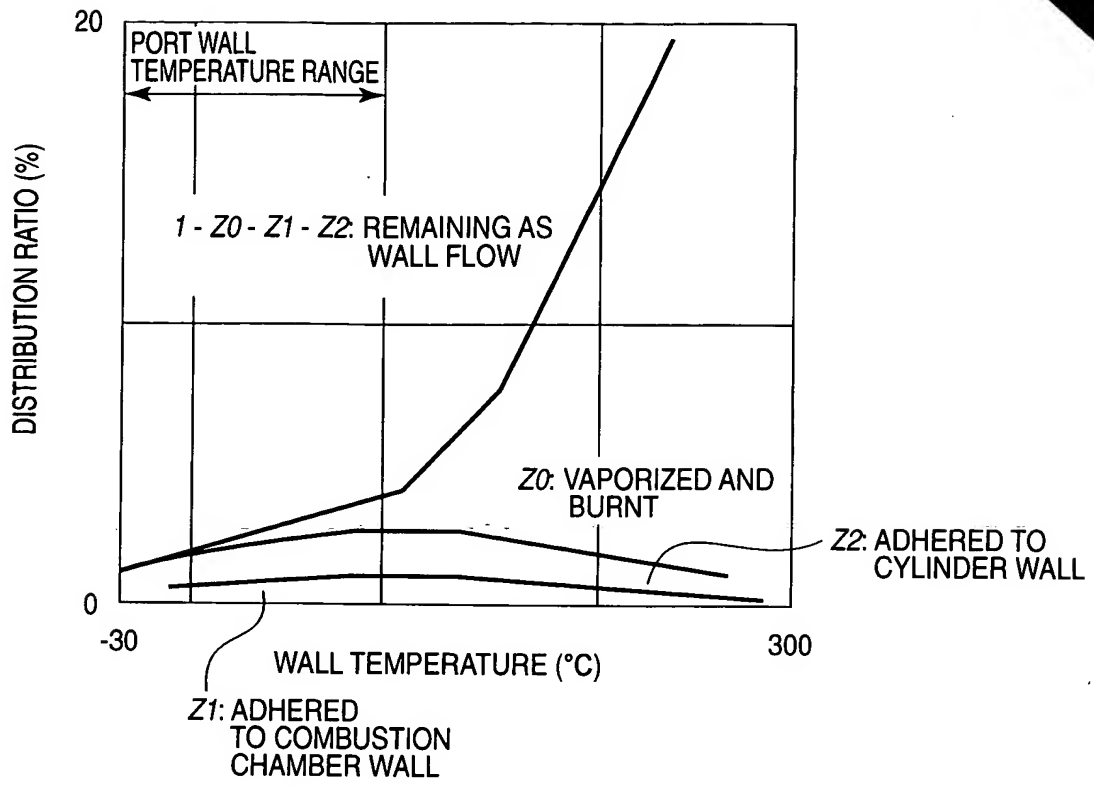
20
PORT WALL TEMPERATURE RANGE
1 - Z0 - Z1 - Z2: REMAINING AS WALL FLOW
DISTRIBUTION RATIO (%)
Z0: VAPORIZED AND BURNT
Z2: ADHERED TO CYLINDER WALL
0
-30
300
WALL TEMPERATURE (°C)
Z1: ADHERED TO COMBUSTION CHAMBER WALL

FIG. 10

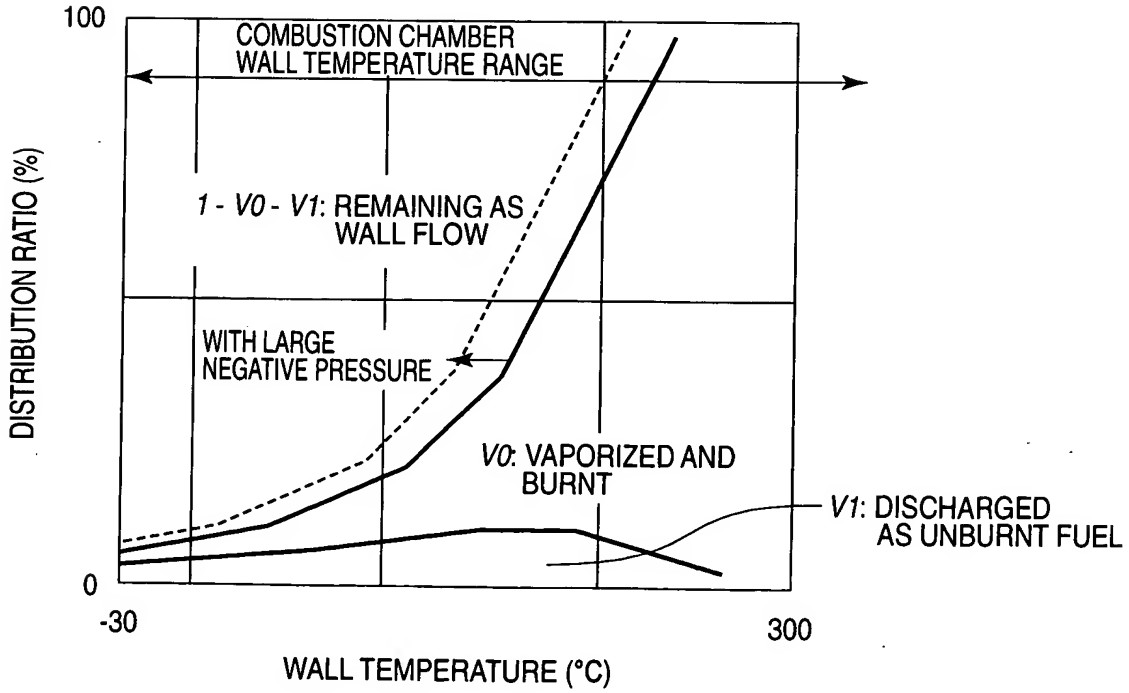
100
COMBUSTION CHAMBER WALL TEMPERATURE RANGE
1 - V0 - V1: REMAINING AS WALL FLOW
DISTRIBUTION RATIO (%)
WITH LARGE NEGATIVE PRESSURE
V0: VAPORIZED AND BURNT
V1: DISCHARGED AS UNBURNT FUEL
0
-30
300
WALL TEMPERATURE (°C)

FIG. 11

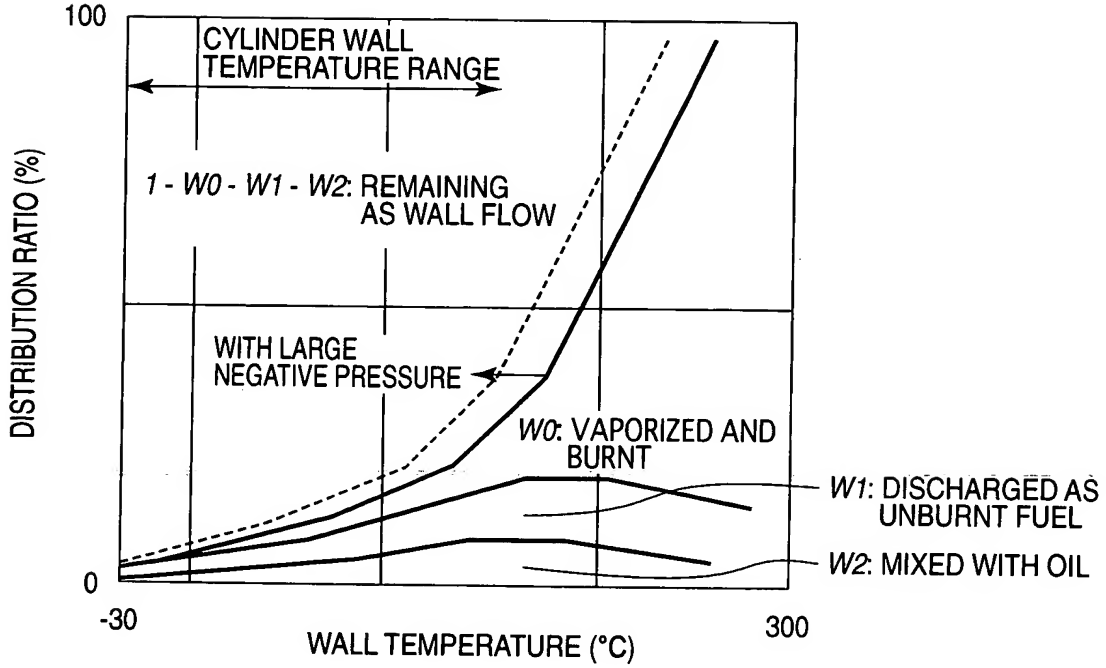
100
CYLINDER WALL TEMPERATURE RANGE
1 - W0 - W1 - W2: REMAINING AS WALL FLOW
WITH LARGE NEGATIVE PRESSURE
W0: VAPORIZED AND BURNT
W1: DISCHARGED AS UNBURNT FUEL
W2: MIXED WITH OIL
DISTRIBUTION RATIO (%)
0
-30
300
WALL TEMPERATURE (°C)

FIG. 12

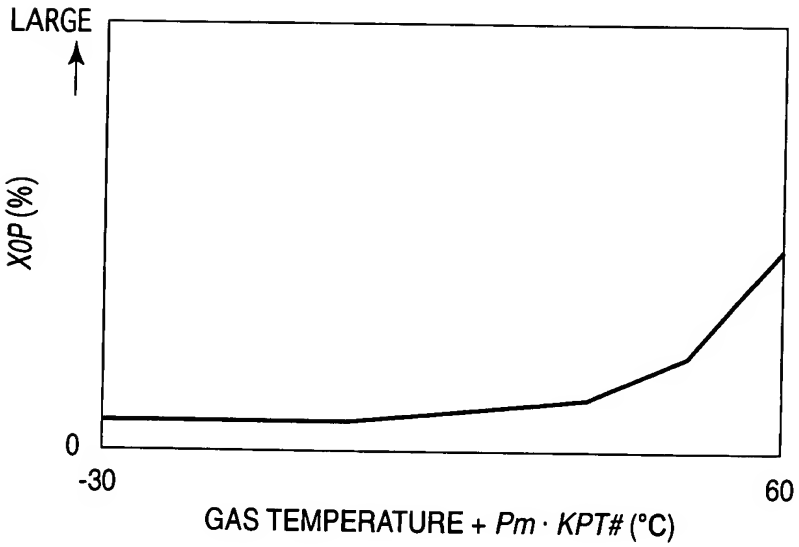
LARGE
XOP (%)
0
-30
60
GAS TEMPERATURE + Pm · KPT# (°C)

FIG. 13

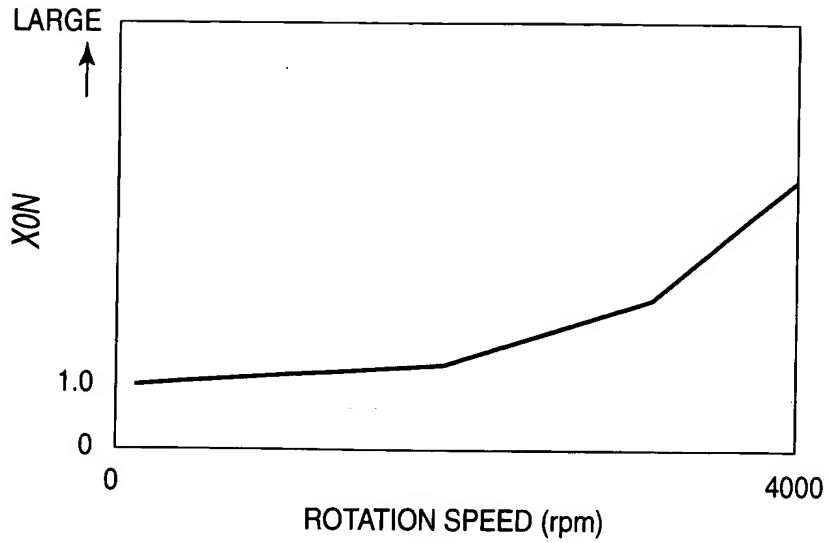
LARGE
XON
1.0
0
0
4000
ROTATION SPEED (rpm)

FIG. 14

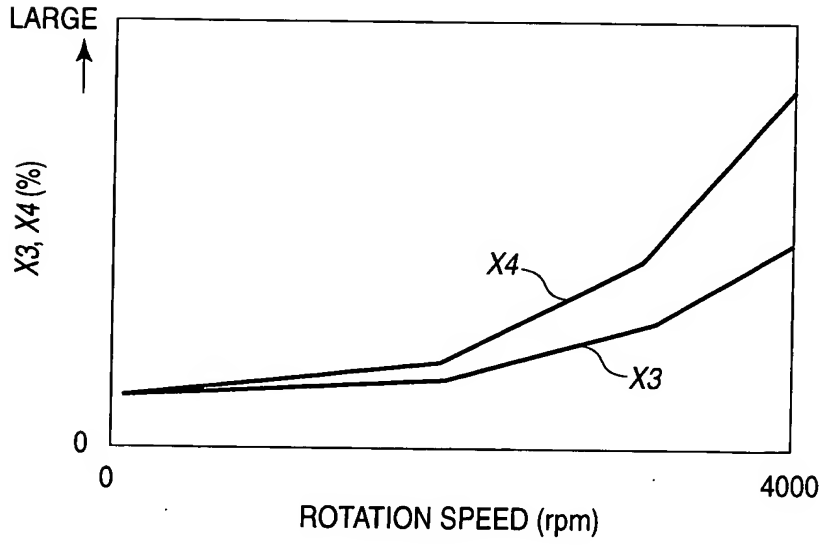
LARGE
X3, X4 (%)
X4
X3
0
0
4000
ROTATION SPEED (rpm)

FIG. 15

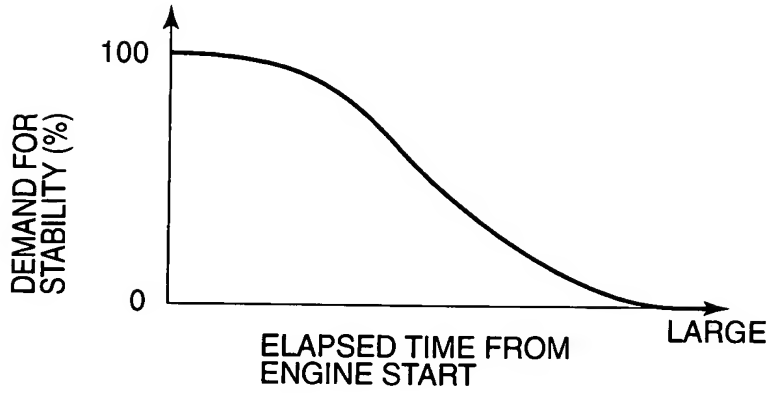

FIG. 16

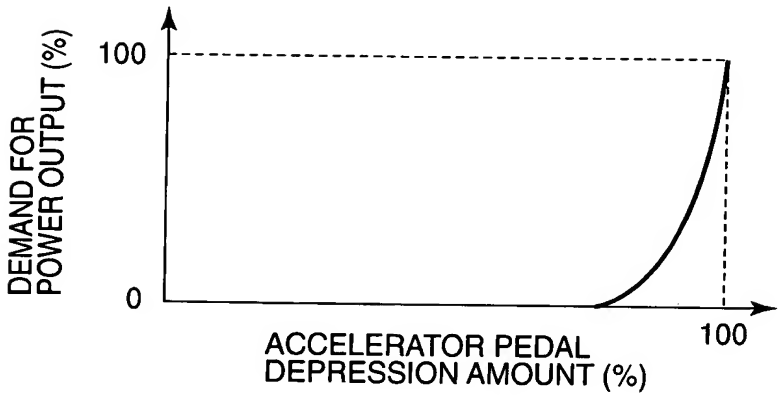

FIG. 17

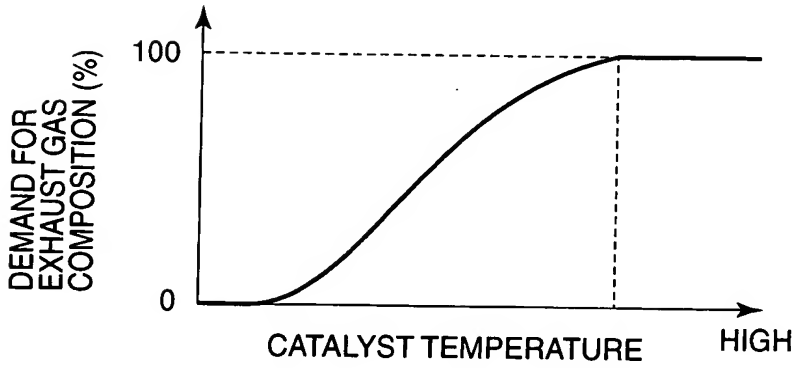

FIG. 18